China & the Global Food Equation

Seventh Annual Daryl F. Kraft Lecture

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University of California, Davis

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Overview

1. Growth of China’s Agriculture.

2. China’s Agricultural Trade: Trends & Projections.

   1. Current Challenges Facing China’s Agriculture.

   2. Impending Structural Reforms in Rural China.
A Global Chill in Commodity Demand Hits America’s Heartland - The New York Times

The fall in prices for crude oil, iron ore and agricultural crops like corn and soybeans is reminiscent of the collapse of the technology boom in 2000 or the bursting of the housing bubble nearly a decade ago.

And behind the pain and anxiety are headwinds blowing from China and other emerging markets, where growth is slowing and demand for the raw materials that drive the global economy has dried up.


CHINA is part of any conversation about:

- Stock market
- Interest rates
- Crude oil
- Cotton
- Sugar
- Pork
- Corn
- Soybeans
- Rice
- Dairy, etc
Average Annual Growth Rates:
China’s Agriculture & Components: 1978-2013

Annual growth rate

<table>
<thead>
<tr>
<th>Component</th>
<th>Annual Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>4.7%</td>
</tr>
<tr>
<td>Crops</td>
<td>3.5%</td>
</tr>
<tr>
<td>Forestry</td>
<td>4.3%</td>
</tr>
<tr>
<td>Livestock</td>
<td>6.3%</td>
</tr>
<tr>
<td>Fisheries</td>
<td>7.3%</td>
</tr>
</tbody>
</table>

Source: NBS, China Statistical Yearbook 2014
China’s Share of World Food Production: 2013

Vegetables
Pork
Apples
Tobacco
Eggs
Tomatoes
Rice
Cotton
Corn
Wheat
Fresh grapes
Chicken
Beef

Cultivated land
Population

Source: compiled from FAO & USDA data.
Share of Agricultural Output Values in China

Shift from low-value to high-value agriculture

China’s Agriculture Grew and Diversified

Source: NBS, China Statistical Yearbook 2014
China’s Sown Area by Crop

Source: NBS, China Statistical Yearbook 2014
China’s position in world agricultural trade reversed

Billion US$

Source: www.intracen.org
Major global agricultural exporters: 2013

Bil $US

China is 4th largest agric. exporter

Major global agricultural importers: 2013

Bil $US

China is largest agric. importer

China’s Self-Sufficiency Slipping for Dairy & Pork

Source: OECD
China’s Self-Sufficiency Slipping in Corn, Cotton & Rice

Source: OECD
Current Situation & Challenges

• About 242 million workers officially “remain” in agriculture (31.4% of the labor force in 2013).

• Highly intensive use of labor, water & fertilizer. Polluted water, air & soil.

• Farmers remain poor (per capita rural income ≤ $1,400/yr in 2013).

• Current structure is inefficient with very small & fragmented farms.

• Land tenure issue is holding back productivity improvements & modernization of China’s agriculture.
Pig Production per Sow: U.S. & China 1990 to 2014

Source: USDA, PS&D View.
China’s average corn yields are much lower & growing more slowly than U.S. yields.

Source: ps&d view usda
### Ageing Farmers May Solve Problem of Labor Trapped in Agriculture

**2013**

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ag. Labor Force</td>
<td>242 million</td>
</tr>
<tr>
<td>Dedicated Ag. Workers</td>
<td>65 million</td>
</tr>
<tr>
<td>Dedicated Farmers as % of Ag. Labor Force</td>
<td>27%</td>
</tr>
<tr>
<td>% Dedicated over 45 yrs age</td>
<td>60%</td>
</tr>
<tr>
<td>% Dedicated under 35 yrs age</td>
<td>14%</td>
</tr>
</tbody>
</table>

**2035**

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedicated Ag. Workers</td>
<td>25 million</td>
</tr>
<tr>
<td>% of Labor Force</td>
<td>3%</td>
</tr>
</tbody>
</table>

*Ageing will speed up decline in ag. labor force & allow for larger farm size*

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*The share of dedicated farmers is calculated from the Rural China 2013 Survey conducted by RCRE. It includes 20410 rural households as observation in this survey.*

Rural urban income gap remains wide

Source: China Statistical Yearbook 2014
Global Pesticide Use per ha.

Source: Malakof & Stokstad, Science, Aug 2013
China’s Fertilizer Use Has Grown Sharply

China Uses $2 \times$ U.S. fertilizer in total & almost $3 \times$ more per acre in 2013

China’s global share of Chem. fertilizer use is $3 \times$ its share of ag. land

Source: FAO, N,P, & K reported in total nutrients.
Water is a Key Issue

• With 20% of the world’s population & 7% of its fresh water, China faces water issues.

• 76% of the country’s water is used by agric., but is facing greater competition from urban areas.

• In the south there is 6 × more water available per capita than in the north. But the north produces 50% of China’s wheat & 30% of its corn—which means that water efficiency must be improved.

• Pricing of surface water & groundwater must play a greater role in the allocation.
The reason that water matters so much in China is the high dependence on irrigation.
### Food Consumption in China (kg/capita)

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<tr>
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</thead>
<tbody>
<tr>
<td>Food Grain</td>
<td>158.4</td>
<td>93.3</td>
<td>95.5</td>
<td>262.1</td>
<td>208.9</td>
<td>164.3</td>
</tr>
<tr>
<td>Fresh Vegs.</td>
<td>138.7</td>
<td>118.6</td>
<td>112.3</td>
<td>134.0</td>
<td>102.3</td>
<td>84.7</td>
</tr>
<tr>
<td>Edible Oil</td>
<td>6.4</td>
<td>9.3</td>
<td>9.1</td>
<td>5.2</td>
<td>6.0</td>
<td>7.8</td>
</tr>
<tr>
<td>Pork</td>
<td>18.5</td>
<td>20.1</td>
<td>21.2</td>
<td>10.5</td>
<td>15.6</td>
<td>14.4</td>
</tr>
<tr>
<td>Poultry</td>
<td>3.4</td>
<td>9.0</td>
<td>10.8</td>
<td>1.2</td>
<td>3.7</td>
<td>4.5</td>
</tr>
<tr>
<td>Beef &amp; Mutton</td>
<td>3.3</td>
<td>3.7</td>
<td>3.7</td>
<td>0.8</td>
<td>1.5</td>
<td>2.0</td>
</tr>
<tr>
<td>Eggs</td>
<td>7.3</td>
<td>10.4</td>
<td>10.5</td>
<td>2.4</td>
<td>4.7</td>
<td>5.9</td>
</tr>
<tr>
<td>Fish</td>
<td>7.7</td>
<td>12.6</td>
<td>15.2</td>
<td>2.1</td>
<td>4.9</td>
<td>5.4</td>
</tr>
<tr>
<td>Milk</td>
<td>4.6</td>
<td>17.9</td>
<td>14.0</td>
<td>1.1</td>
<td>2.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Melons/Fruit</td>
<td>41.1</td>
<td>56.7</td>
<td>56.1</td>
<td>5.9</td>
<td>17.2</td>
<td>22.8</td>
</tr>
</tbody>
</table>

Source: NBSC, China Statistical Yearbook. Food grain is unprocessed for rural and urban.

Urbanization will be a key driver of changing consumer diet

U.S. consumption pork: 21kg, poultry 35kg, beef 25kg
Growing Urbanization in China

China’s urbanization lags behind that of other countries at similar levels of development.

In 2030 China’s cities will be home to 1 billion; 70% of the population, compared with 54% today.

Source: UN, World Population Prospects
China’s Corn Imports Uncertain

USDA projected China would account for 40% of rise in global corn trade in next decade & would become the leading importer.


Note: The Nov 2013 Projection was through 2023/24. The 2024/25 figure was set equal to 2023/24.
China’s Share Pork Imports Projected to Grow

USDA projects China will become largest pork importer.

China’s Soybean Imports Projected to Grow

Soybean Import Projections (mmt)

China’s Future Agricultural Sector

- China will become more dependent on international trade in food products.

- As China’s agriculture modernizes, China will concentrate production more on labor intensive horticultural products.

- China’s agricultural sector will have much different characteristics in 15 or 20 years.

- We all have an interest in China’s ability to make this transition towards a modern agricultural sector.
Agricultural Policy Reforms at a Tipping Point in China

- Food/grain security vs. farm incomes (e.g., land tenure & small size of farms - fragmented).
- Rural-Urban income gap & growth in income inequality.
- Management of natural resources-water scarcity.
- Resource depletion, heavy use of chemicals, & rising agric. pollution are major concerns.
- Food Safety.
- Role of International Trade.
- Role of Biotechnology/GMOs?
Sunrise in Beijing: “Tomorrow is Another Day”